Space Weather Technical Forecast

Issued on Saturday, 06 April 2024 at 01:14 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: No significant activity forecast.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity was Low with a peak flare of C3.8 flare observed at 05/0305UTC from just over the southeast limb. There are six sunspot regions on the visible disc. AR3629 and AR3630 have developed modestly but notably. All regions are still simple and relatively stable, with AR3628, a large region in the northeastern hemisphere, is a simple unipolar sunspot.

No Earth-directed CMEs have been observed, with a CME from the southwest assessed as being on the farside of the Sun.

Solar Wind / Geomagnetic Activity: Solar wind speeds have shown a declining trend over the last 24 hours from 475km/s down to close to 400km/s as observed by DSCOVR as the high speed stream from coronal hole 16 waned through the period. Density has also declined but remained at average levels. Total magnetic field strength was weak throughout, below 8nT, with the north-south component, weakly, but consistently negative. Phi angle was negative (towards the Sun) throughout. Geomagnetic activity was Quiet to Unsettled (Kp2-3).

Energetic Particles / Solar Radiation: High energy proton flux (greater than 10MeV) observed at GOES-18 was at background. High energy electron flux (greater than 2MeV) observed at GOES-16 was at background. The associated 24-hour fluence remained well below the Active (1e8 integrated flux) threshold, with a value of 6.69e6 integrated pfu at 06/0000UTC.

Four-Day Space Weather Forecast Summary
Solar Activity: Low to Very Low activity is expected through the period, with a slight chance of isolated M-class flaring. There is an increasing risk of M-class activity as the period progresses.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs. Solar winds are expected to continue to trend towards background on 06 and 07 Apr. A further slightly elevated high speed stream may then connect with the Earth on 09 Apr, although this is low confidence. Geomagnetic activity is forecast to be Quiet to Unsettled on 06 Apr, with a decreasing risk through 07 and 08 Apr. Further Unsettled to Active intervals are then possible on 09 Apr, but with a high level of uncertainty.

Energetic Particles / Solar Radiation: High energy proton flux as observed by GOES-18, is expected to remain at background. High energy electron flux is forecast to initially be at background, but with a chance of a rising trend to moderate with a slight chance of high levels at diurnal peak from 07 Apr. Electron fluence is expected to remain below the Active (1e8 integrated pfu) threshold throughout.

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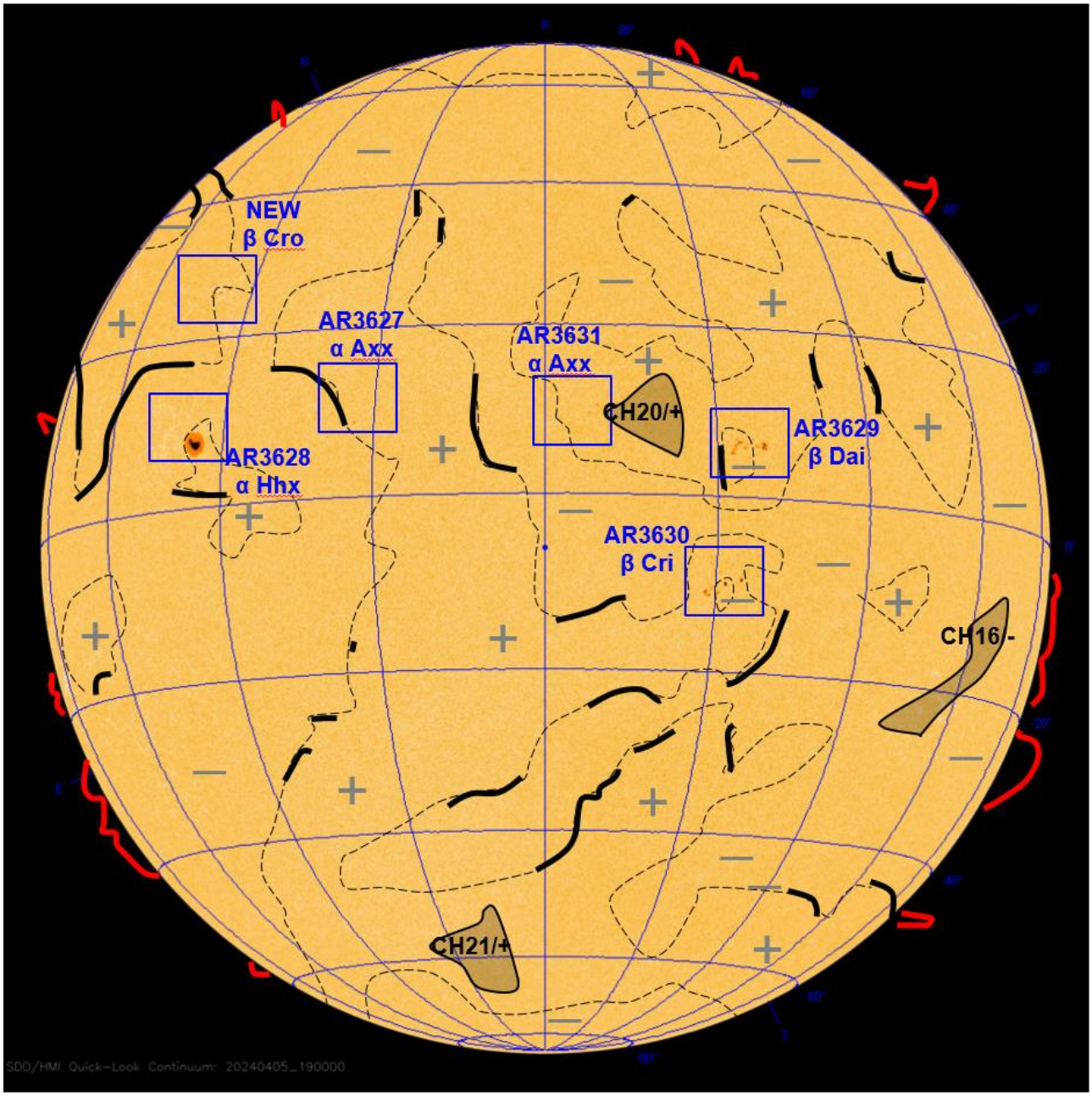
Figure 1. Solar Analysis Valid 06/2000UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Geomagnetic Storms:

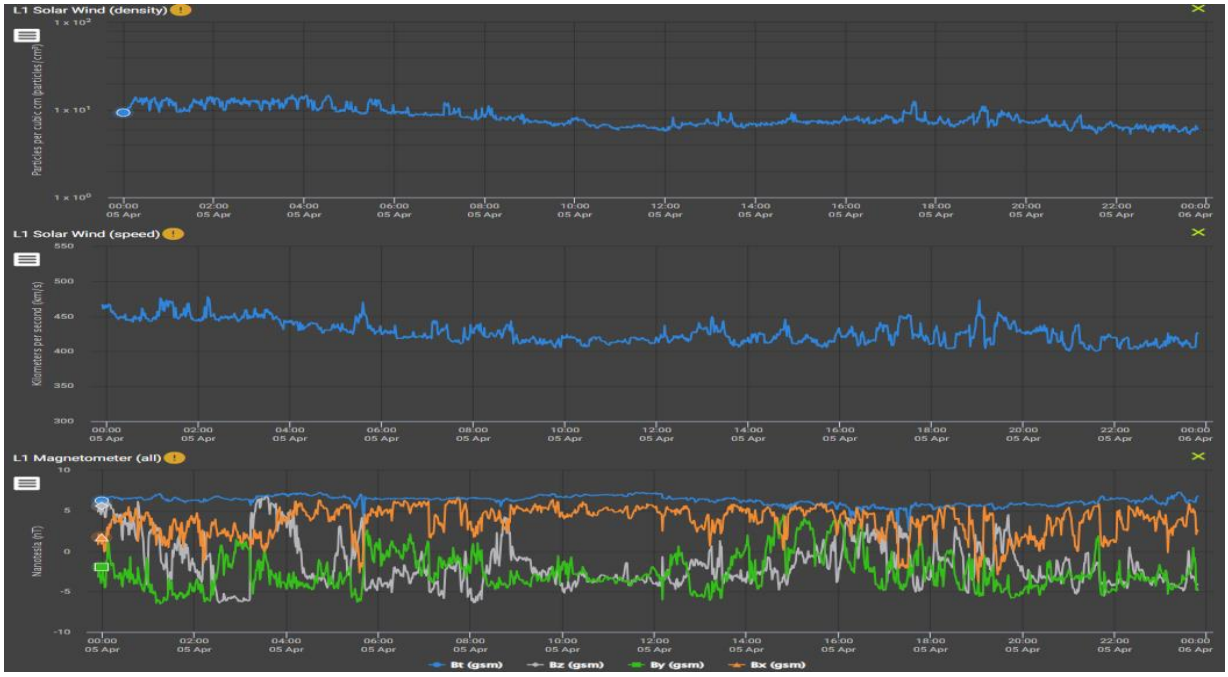
No Earth-directed CMEs have been observed.

Solar wind speeds are slightly elevated at between 400-450km/s on a declining trend. This trend is likely due to the declining high speed stream from coronal hole 16. The high speed stream is expected to continue to decline through the next two days. Coronal hole 20, in north centre disc may also connect on 09 Apr, but this a weak, recently developed feature with uncertainty in potential connection and strength of any high speed stream.

Geomagnetic activity is forecast to be mainly Quiet to Unsettled through 06 Apr, but with a decreasing chance of Unsettled intervals into 07 and 08 Apr. There may be a further risk of Unsettled to Active intervals on 08 and 09 Apr due to the uncertain connection to coronal hole.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Figure 2: Solar winds parameters from DSCOVR for the last 24 hours.



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Radio Blackouts - X-Ray Flares:

Low or Very Low activity is expected to continue with a likelihood of further C-class flaring. There is a slight chance of M-class flares, with a number of smaller regions beginning to show signs of development. Magnetic looping on the eastern limb could signal an increased risk of significant flares over the forecast period.

Six regions are visible on the solar disc, with all relatively simple. However AR3629 and AR3630 are showing modest growth. The largest region, AR3626 in the northeast quadrant is a large but stable alpha spot.

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	20	20	30	20
Very Active	R3 to R5 X Class	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

High energy proton flux as observed by GOES-18 is at background levels. This is expected to remain so, with none of the visible active regions currently expected to bring a risk of significant proton rich flares.

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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High Energy Electrons Event (≥ 2MeV):
High energy electron flux at GOES-16 is likely to oscillate between background and moderate levels through the next four days, due to the effects of the current, but declining, coronal hole high speed stream connection. There is a low chance of reaching the high threshold on diurnal peaks later in the forecast period.

Electron fluence values are expected to follow an increasing trend, but remain below the Active threshold.

GEO Electron Environment	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ 2 MeV ≥ $1x10^8$	No	1	1	1	1
Very Active	≥ 2 MeV ≥ $1x10^9$	No	1	1	1	1

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